



PATENT APPLICATION

PATENT AND TRADEMARK OFFICE

BEFORE THE HONORABLE BOARD OF PATENT APPEALS AND INTERFERENCES

In re the Application of

Takashi MIYAKAWA et al.

On Appeal from Group: 1732

Application No.: 10/717,502

Examiner: J. WOLLSCHLAGER

Filed: November 21, 2003

Docket No.: 117848

For: PROCESS FOR PRODUCTION OF FORMED HONEYCOMB BODY, AND
HONEYCOMB STRUCTURE

APPEAL BRIEF TRANSMITTAL

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Attached hereto is our Brief on Appeal in the above-identified application.

Also attached hereto is our Check No. 194760 in the amount of Five Hundred Dollars (\$500.00) in payment of the Brief fee under 37 C.F.R. 41.20((b)(2)). In the event of any underpayment or overpayment, please debit or credit our Deposit Account No. 15-0461 as needed in order to effect proper filing of this Brief.

Respectfully submitted,

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BRIEF ON APPEAL

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Application No. 10/717,502

I. REAL PARTY IN INTEREST

The real party in interest for this appeal and the present application is NGK Insulators, Ltd., by way of an Assignment recorded in the U.S. Patent and Trademark Office at Reel 014728, Frame 0557.

II. RELATED APPEALS AND INTERFERENCES

There are no prior or pending appeals, interferences or judicial proceedings, known to Appellants, Appellants' representative, or the Assignee, that may be related to, or that will directly affect or be directly affected by or have a bearing upon, the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 1-10 and 13 are on appeal.

Claims 1-10 and 13 are pending.

Claims 1-10 and 13 are rejected.

IV. STATUS OF AMENDMENTS

No Amendment After Final Rejection has been filed.

V. SUMMARY OF CLAIMED SUBJECT MATTER

Claim 1 is directed to a process for producing a formed honeycomb body using a crushed green body obtained from a rejected product of an undried formed material. A honeycomb structure is ordinarily produced by mixing a raw material with a binder and water to obtain a compounded mixture for forming a green body. This compounded mixture is then kneaded and extruded by a continuous extruder into a honeycomb shape to form a green body from the compounded mixture (i.e., undried formed material). This green body is subsequently dried and fired to obtain a dried formed material (i.e., a formed honeycomb body)(see page 1, line 27 - page 2 line 4).

When the green body is formed and/or after the green body is dried, defects such as cell deformation, longitudinal cracking and the like can occur. This results in rejected products of both: (1) undried formed material, and (2) dried formed material. Others have tried to reuse the rejected products of dried formed material (see page 2, lines 5-15).

However, others attempts at reusing undried formed material have failed, as there are additional problems associated with reusing undried formed material. An undried green body contains 20% water by mass and has a high viscosity. Therefore, the undried green body turns into fist-sized lumps when it is added to raw material, resulting in a non-uniform mixture of raw material and undried formed material. This non-uniform mixture puts an excessive load on the continuous extruder, which makes its operation unstable and results in defective products (see page 2, line 25 - page 3, line 7). Thus, in the past, the non-uniform mixture required pre-kneading before it was kneaded and fed into the continuous extruder. This pre-kneading and feeding process was so arduous and inefficient that most rejected undried green bodies have continued to simply be disposed of as waste (see page 3; lines 8-13).

The claimed invention solves the problems of the prior art by efficiently reusing a rejected undried green body. By reusing undried green bodies in the manner claimed, there are both cost, time and quality savings because: (1) energy does not need to be expended to dry the undried green body before reuse and undried products are not simply disposed of as waste, (2) the material can be reused earlier in the process because one does not have to wait to dry the green body before reuse, and (3) unlike a dried formed material, the undried green body has substantially the same composition as the compounded mixture for forming a green body, resulting in a better product.

Claim 1 recites, in part, "mixing, by a mixer, a raw material for forming a honeycomb body structure containing at least a ceramic raw material powder, a binder and water, to obtain a compounded mixture for forming a green body; adding a predetermined amount, to the raw material for forming the honeycomb body, a powdery material obtained by crushing, into a maximum particle diameter of 50 mm or smaller, a crushed green body having substantially same composition as the compounded mixture for forming the green body, the crushed body being obtained from a rejected product of an undried formed material, and a resulting mixture is mixed thoroughly by the mixer to obtain the compounded mixture for forming the green body; and kneading and extruding the compounded mixture for forming the green body into a honeycomb shape by a continuous extruder, to obtain the formed honeycomb body; wherein the mixer includes a hoe that rotates at a low speed and a chopper having a cross-shaped blade that rotates at a high speed."

Claim 3 recites, in part, "wherein the crushed green body is added in an amount about 30 parts by mass or less relative to about 100 parts by mass of the ceramic raw material powder" would have been obvious." Claim 4 recites a similar feature.

Crushing the green body into a powdery material with a maximum particle diameter of 50 mm or smaller prevents the fist-sized lumps of green body which cause excessive strain

in the continuous extruder. Additionally, crushing the green body as claimed reduces the generation of various defects such as voids, bending, cell deformation and the like (see page 12, lines 9-18).

VI. GROUND OF REJECTION TO BE REVIEWED ON APPEAL

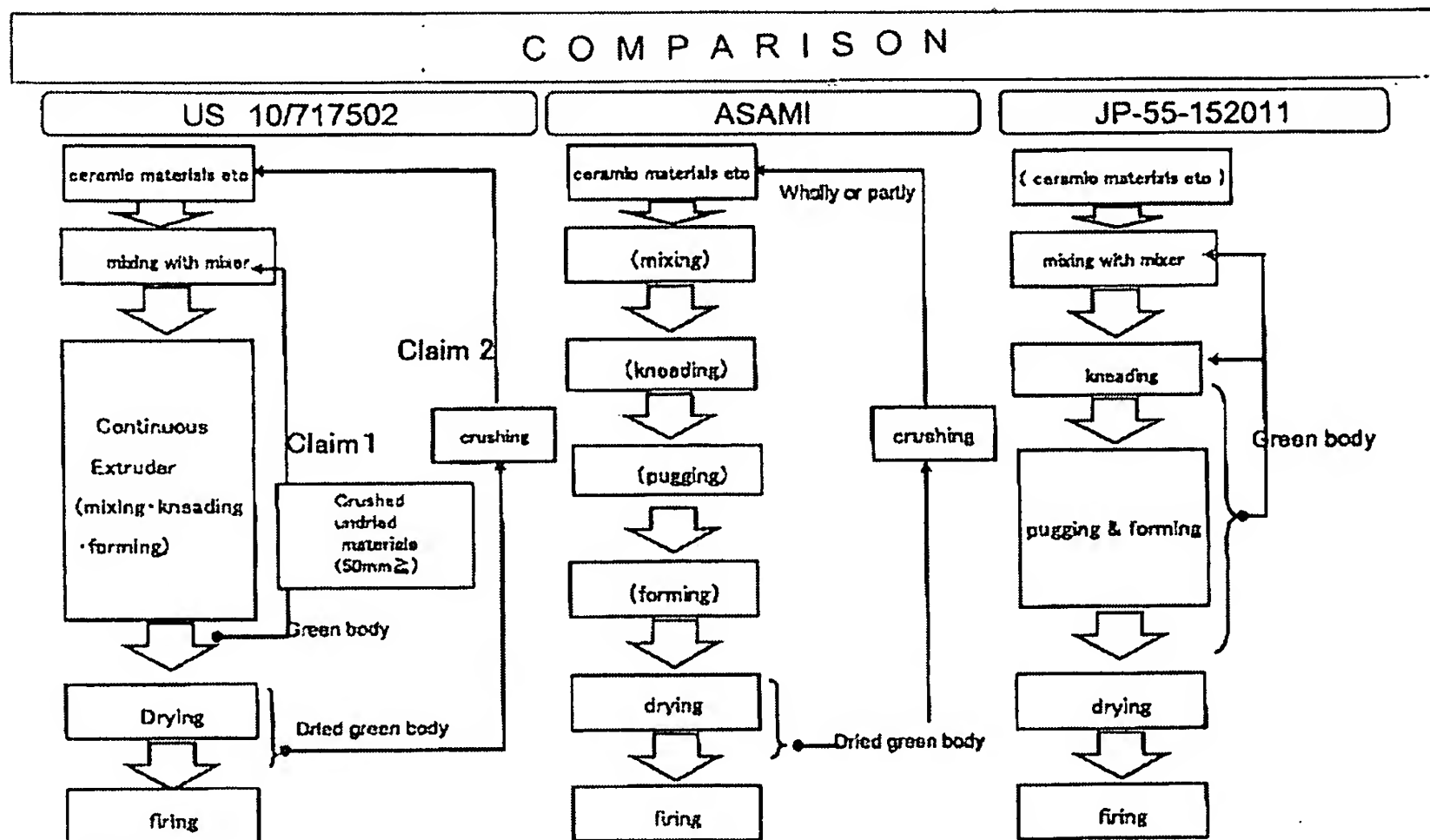
The following grounds of rejection are presented for review:

Claims 1-10 and 13 are rejected as having been obvious under 35 U.S.C. §103(a) over U.S. Patent No. 4,851,376 (Asami) in view of JP55-152011 (JP 55).

VII. ARGUMENTS

The Office Action rejects claims 1-10 and 13 under 35 U.S.C. §103(a) over U.S. Patent No. 4,851,376 (Asami) in view of JP55-152011 (JP 55). For the reasons discussed below, it is respectfully submitted that the rejection is in error and that all pending claims are in condition for allowance. Reversal of the rejection is respectfully requested.

A comparison between the claimed process, Asami, and JP 55 is produced below



A. **Claims 1-10 Would Not Have Been Obvious Under 35 U.S.C. §103 Over Asami in View of JP 55**

Claim 1 recites, in part, "mixing, by a mixer, a raw material for forming a honeycomb body structure containing at least a ceramic raw material powder, a binder and water, to obtain a compounded mixture for forming a green body; adding a predetermined amount, to the raw material for forming the honeycomb body, a powdery material obtained by crushing, into a maximum particle diameter of 50 mm or smaller, a crushed green body having substantially same composition as the compounded mixture for forming the green body, the crushed body being obtained from a rejected product of an undried formed material, and a

resulting mixture is mixed thoroughly by the mixer to obtain the compounded mixture for forming the green body; and kneading and extruding the compounded mixture for forming the green body into a honeycomb shape by a continuous extruder, to obtain the formed honeycomb body; wherein the mixer includes a hoe that rotates at a low speed and a chopper having a cross-shaped blade that rotates at a high speed."

To establish a *prima facie* case of obviousness, there must be: (1) some suggestion or motivation to modify the reference or to combine reference teachings, and (2) a reasonable expectation of success. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in Applicants' disclosure. The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination (see MPEP §2143). The question under 35 U.S.C. §103 is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious (see MPEP §2141.02).

As acknowledged by the Office Action, Asami fails to teach or suggest "the mixing of undried reclaimed material with a raw ceramic material." The Office Action relies on JP55 to teach such a feature and alleges that it would have been obvious to combine Asami with JP55 because: 1) Asami teaches adding water to a dried reclaimed material in order to reduce the mechanical impact on the particles; and 2) one of ordinary skill in the art would have been motivated to combine Asami and JP55 to eliminate an undesired process step, such as drying (see MPEP § 2144.04) because Asami teaches that adding water is beneficial and JP55 shows that drying is not required. The Advisory Action modified its motivation to combine Asami with JP55. Specifically, the Advisory Action asserted that because JP55 shows that "ceramic material does not need to be dried in order to be recycled," the combination "does suggest the

elimination of a process step." These assertions are based on incorrect premises, and are otherwise improper as explained below.

1. The Office Action Fails to Provide A Proper Suggestion or Motivation To Combine Asami with JP 55

The Office Action and the Advisory Action have failed to provide a proper suggestion or motivation to combine Asami with JP 55. Specifically, (1) the Office Action improperly uses different embodiments of Asami, (2) there is no disclosure in the applied art that would suggest the desirability of combining Asami with JP 55, nor would one of ordinary skill in the art be motivated to combine Asami with JP 55, and (3) the combination of Asami with JP 55 does not "eliminate" a process step.

a. The Office Action's Analysis Improperly Combines Different Embodiments Of Asami

The Office Action asserts that Asami teaches that adding water to dried unclaimed material is beneficial because it reduces impact to the particles. However, such a teaching is: (A) taken out of context, and (B) would not have been applicable to the context of the claimed invention, in which crushing is used, because "reducing impact" is incompatible with "crushing."

Asami teaches lightly smashing the unfired scrap under a relatively small mechanical impact to reduce damage. As a separate embodiment, Asami also teaches an alternative to the mechanical impact is adding water to dried, unfired shaped scrap so that the scrap is available in the form of a slurry or green batch so as to divide the scrap into particles. The slurry is then screened or sieved. See col. 8, lines 45-59. Thus, Asami does not teach adding water to a dried reclaimed material in order to reduce the mechanical impact on the particles that have been crushed, as suggested in the Office Action; rather, adding water to the reclaimed cordierite allows for dividing particles of dried unclaimed material by adding water without applying mechanical impact (i.e. not crushing, as claimed in claim 1). Even with the addition

of water, the particles are still particles made from dried unclaimed material. Moreover, the addition of water creates a "slurry," which is clearly different from the "powdery material" of the claimed invention.

Thus, because the Office Action improperly combines two different embodiments in Asami, reversal of the rejection is respectfully requested.

b. Asami Teaches Away From Using Undried Green Bodies Because Asami Uses Reclaimed Dried Cordierite Articles Because of Art-Recognized Problems With Reusing Undried Green Bodies

Asami uses dried cordierite articles specifically because of the art-recognized problems with reusing undried green bodies, as discussed above. Asami is directed to creating cordierite ceramic bodies that exhibit a sufficiently low coefficient of thermal expansion using reclaimed dried cordierite material so as to create stable cordierite ceramic bodies (see col. 2, lines 13-46). Asami discloses that the coefficient of thermal expansion is "the most important property of a cordierite ceramic body" (see col. 4, line 66 - col. 5, line 2), and notes that the coefficient of thermal expansion is closely associated with a cordierite reaction process in which "the cordierite is crystallized at a temperature between 1200° C and 1350° C." A coefficient of thermal expansion that is too high results in a substandard formed body after firing. Thus, Asami must carefully check the cordierite reaction ratio R of dried cordierite articles to eliminate the dried cordierite articles it deems unusable (see col. 5, lines 24-49).

As a result, Asami must check the coefficient of thermal expansion because of drying or processing itself. This is strong evidence that Asami desires the use of dried cordierite articles specifically because of the problems associated with using undried formed material. Therefore, the only teaching or suggestion to make the claimed combination has been impermissibly found in Applicants' own disclosure.

Therefore, because Asami uses reclaimed dried cordierite articles because of art-recognized problems with reusing undried green bodies, reversal of the rejection is respectfully requested.

c. Asami, in Combination With JP 55, Does Not "Eliminate" a Process Step

Combining and modifying Asami and JP 55 to arrive at the claimed invention cannot be achieved merely by eliminating process steps. Instead, arriving at the claimed invention can only occur if the process steps were changed. Thus, no process steps would be "eliminated" by the combination of Asami with JP 55. Additionally, the Office Action is incorrect in asserting that it would have been obvious to combine Asami with JP55 because:

1) Asami teaches adding water to a dried reclaimed material in order to reduce the mechanical impact on the particles; and 2) one of ordinary skill in the art would have been motivated to combine Asami and JP55 to eliminate an undesired process step. Specifically, "adding water" to the "dried" formed material of Asami is adding, and not eliminating, a process step.

Further, JP55 discloses a punching method wherein chip-like articles are obtained by punching a kneaded material. A pottery raw material having moderate amount of water is extruded by a vacuum extruding machine, and part of the pottery raw material extruded from the vacuum extruding machine is returned back to the process before kneading to facilitate kneading of the raw pottery material so as to decrease distortion. The kneaded material contains materials that remains after punching, such as punched residues collected after punching with a kneader. Thus, JP55 does not disclose mixing a rejected product of an undried formed material, as claimed. Rather, it simply removes and re-adds material to facilitate kneading. Further, JP55 discloses a method which is free from the formation of the lumps in the green body to be extruded from an extruder, and thus does not teach or suggest the problem solved by embodiments of the claimed invention. Moreover, JP55 does not

teach or suggest formation of through channels as cells, which is a requisite element of a honeycomb green body.

Finally, as discussed above, Asami desires using a dried cordierite article. As a result, even if the combination eliminated a process step, it does not eliminate an undesired process step. Therefore, there would have been no motivation to combine JP55 with Asami.

2. The Applied Prior Art Does Not Teach or Suggest "A Hoe That Rotates At A Low Speed And A Chopper That Rotates At a High Speed" in The Context of The Claimed Invention

The Office Action fails to specifically address the claimed mixer including "a hoe that rotates at a low speed and a chopper having a cross-shaped blade that rotates at a high speed." Instead, the Office Action takes official notice that "the use of either a single screw, twin screw extruder, [and] a mixer having a hoe is well known in the art." Further, the Office Action takes official notice that "optimizing the operating speed of a mixer or extruder is also well known in the extrusion art." The Advisory Action asserts that the "claimed mixer" is known in the art, and provides various references. Even if these assertions are correct, they do not satisfy the legal requirements of an obvious analysis, as explained below.

a. The Office Action Improperly Relies on "Common Knowledge" in The Art Without Evidentiary Support

The Office Action takes official notice that the use of a mixer having a hoe is well known in the art. Further, the Office Action takes Official Notice that optimizing speed is well known in the extrusion art. The taking of official notice is respectfully traversed.

As noted in MPEP §2144.03, it "is never appropriate to rely solely on 'common knowledge' in the art without evidentiary support in the record, as the principal evidence upon which a rejection was based." The ceramic molding arts, in certain instances, may use a mixer having a hoe or a single or twin screw extruder. However, the Office Action fails to indicate how the use of these instruments in the context of the claimed invention is common

knowledge or well-known in the art. The Advisory Action submits several references showing various mixers. However, the Advisory Action also does not discuss how the use of these instruments in the context of the claimed invention is well-known in the art.

b. The Office Action's Motivation Of Using The Claimed Mixer to Reduce Mixing Shear is Improper, Because The Claimed Mixer Increases Mixing Shear

The Advisory Action fails to respond to Appellants' argument in the Request for Reconsideration After Final Rejection, that the Office Action's alleged motivation of using a mixer having a hoe in order to "provide a stable product wherein damage to the material is not caused by excessive mixing shear" is actually contrary to the "chopper . . . that rotates at a high speed" feature of claim 1. The claimed invention does not seek to reduce excessive mixing shear; rather, a mixer with a hoe that rotates at a low speed would allow raw material to be stirred by the hoe, and a cross-shaped blade rotating at a high speed would allow raw material to be made fine by chopping of the blade. See, e.g., paragraph [0028]. One of ordinary skill in the art would recognize that the cross-shaped blade rotating at a high speed would increase shear, not reduce it, and therefore clearly would not have been motivated to make the claimed invention, if the goal were to reduce mixing shear as alleged by the Office Action.

Further, Asami notes that the particles of an ordinary cordierite material are soft and easily damaged by mechanical impacts and can undergo mechanochemical changes in their crystal structure. In order to reduce the probability of this damage and/or these changes, Asami clearly indicates to only use relatively "small impact" and to "lightly" smash the material (see col. 7, line 62 - col. 8, line 11). Thus, the increase of mixing shear would be contrary to Asami's teachings, as it would damage Asami's particles.

**B. Claims 3 and 4 Would Not Have Been Obvious Over Asami
in View of JP 55**

Claim 3 recites, in part, "a process for producing a formed honeycomb body according to Claim 1, wherein the crushed green body is added in an amount about 30 parts by mass or less relative to about 100 parts by mass of the ceramic raw material powder." Claim 4 recites a similar feature.

**1. The Office Action Fails to Present Evidence That
The Allegedly Optimizable Variables Were Recognized As
Result-Effective Variables in The Prior Art**

While only routine skill in the art may be required to discover an optimum value of a recognized result-effective variable, the relative ratios of claims 3 and 4 are not recognized in the prior art as a result-effective variable. The Office Action asserts that it would have been obvious to have optimized the relative ratios of reclaimed material to raw materials through routine experimentation, because it has been held that discovering an optimum value of a result-effective variable involves only routine skill in the art. However, MPEP §2144.05(II)(B) states that "a particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation" (emphasis added).

Therefore, to support the assertion in the Office Action that the recited ratio of "wherein the crushed green body is added in an amount about 30 parts by mass or less relative to about 100 parts by mass of the ceramic raw material powder" would have been obvious through optimization of a result-effective variable, the prior art must first teach or suggest that the amount of crushed green body obtained from a "rejected product of an undried formed material" is known to be a result-effective variable.

The applied prior art does not recognize that the recited ratio is a result-effective

variable. As discussed above, the applied prior art does not disclose the use of a "rejected product of an undried formed material." Accordingly, the only indication of record, of a ratio of crushed green body to ceramic raw material powder exists in Appellants' own disclosure, and strongly suggests improper hindsight reasoning has been applied.

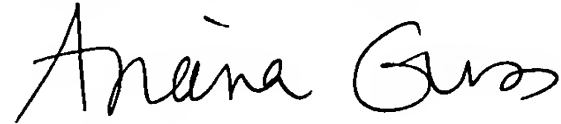
C. Claims 1-10 Require The Crushed Green Body is a Crushed Undried Green Body

The Advisory Action presents a new issue regarding clarity of claim 1, and states that the claims do not positively require "crushed green body" be a "crushed undried green body." As discussed above, claim 1 recites, in part, "a crushed green body having substantially same composition as the compounded mixture for forming the green body, the crushed body being obtained from a rejected product of an undried formed material." This language is sufficiently clear to indicate that a crushed undried green body is the material added and mixed with the raw material. The claim language standing alone, as well as read in context of the specification, require that the crushed green body be a crushed undried green body.

VIII. CONCLUSION

For all of the reasons discussed above, it is respectfully submitted that the rejections are in error and that claims 1-10 and 13 are in condition for allowance. For all of the above reasons, Appellants respectfully request this Honorable Board to reverse the rejections of claims 1-10 and 13.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Ariana Guss". The signature is fluid and cursive, with the first name "Ariana" written in a larger, more prominent script than the last name "Guss".

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APPENDIX A - CLAIMS APPENDIX

CLAIMS INVOLVED IN THE APPEAL:

1. (Previously Presented) A process for producing a formed honeycomb body, the process comprising:

mixing, by a mixer, a raw material for forming a honeycomb body structure containing at least a ceramic raw material powder, a binder and water, to obtain a compounded mixture for forming a green body;

adding a predetermined amount, to the raw material for forming the honeycomb body, a powdery material obtained by crushing, into a maximum particle diameter of 50 mm or smaller, a crushed green body having substantially same composition as the compounded mixture for forming the green body, the crushed body being obtained from a rejected product of an undried formed material, and a resulting mixture is mixed thoroughly by the mixer to obtain the compounded mixture for forming the green body; and

kneading and extruding the compounded mixture for forming the green body into a honeycomb shape by a continuous extruder, to obtain the formed honeycomb body;

wherein the mixer includes a hoe that rotates at a low speed and a chopper having a cross-shaped blade that rotates at a high speed.

2. (Previously Presented) A process for producing a formed honeycomb body according to Claim 1, wherein the ceramic raw material powder contains a regenerated raw material powder obtained by drying a green body having the substantially same composition as the compounded mixture for forming the green body and crushing the dried green body.

3. (Previously Presented) A process for producing a formed honeycomb body according to Claim 1, wherein the crushed green body is added in an amount about 30 parts by mass or less relative to about 100 parts by mass of the ceramic raw material powder.

4. (Previously Presented) A process for producing a formed honeycomb body according to Claim 2, wherein the crushed green body is added in an amount of about 30 parts by mass or less relative to about 100 parts by mass of the ceramic raw material powder.

5. (Previously Presented) A process for producing a formed honeycomb body according to Claim 1, wherein raw materials for forming the honeycomb body structure are mixed by the mixer, then the crushed green body is added thereto in the form of powdery material, and a resultant is mixed by the mixer to obtain the compounded mixture for forming the green body.

6. (Previously Presented) A process for producing a formed honeycomb body according to Claim 2, wherein raw materials for forming the honeycomb body structure are mixed by the mixer, then the crushed green body is added thereto in the form of powdery material, and a resultant is mixed by the mixer to obtain the compounded mixture for forming the green body.

7. (Previously Presented) A process for producing a formed honeycomb body according to Claim 3, wherein raw materials for forming the honeycomb body structure are mixed by the mixer, then the crushed green body is added thereto in the form of powdery material, and a resultant is mixed by the mixer to obtain the compounded mixture for forming the green body.

8. (Original) A process for producing a formed honeycomb body according to Claim 1, wherein a single-screw or multi-screw extruder or kneader is used as the continuous extruder.

9. (Original) A process for producing a formed honeycomb body according to Claim 2, wherein a single-screw or multi-screw kneading extruder is used as the continuous extruder.

10. (Original) A process for producing a formed honeycomb body according to Claim 3, wherein a single-screw or multi-screw kneading extruder is used as the continuous extruder.

11-12. (Canceled)

13. (Previously Presented) A process for producing a formed honeycomb body according to Claim 1, wherein an average specific total volume shared by distributed pores is about 0.135 cc/g.